Automate the business loan approval system for a central bank using historical data of borrowers

Problem Statement

About the data
The dataset is from the U.S. Small Business Administration (SBA)
The U.S. SBA was founded in 1953 on the principle of promoting and assisting small enterprises in the U.S. credit market (SBA Overview and History, US Small Business Administration (2015)). Small businesses have been a primary source of job creation in the United States; therefore, fostering small business formation and growth has social benefits by creating job opportunities and reducing unemployment.
There have been many success stories of start-ups receiving SBA loan guarantees such as FedEx and Apple Computer. However, there have also been stories of small businesses and/or start-ups that have defaulted on their SBA-guaranteed loans.

Business Objectives
This case study aims to identify patterns which indicate if a client has difficulty paying their instalments which may be used for taking actions such as denying the loan, reducing the amount of the loan, lending (to risky applicants) at a higher interest rate, etc. Automate a loan Approval system

Presented by
Jubin Benny

Automated system operation:

In recent years, automation has become increasingly popular as a means of streamlining this process. In any organization, there are certain criteria that need to be met before a decision is made.

These criteria are designed to ensure that the decision-making process is objective and that the outcome is in the best interest of the organization.

Automated system operations (ASO) is the set of software and hardware that allows computer systems, network devices or machines to function without any manual intervention. ASOs allow computer systems to work without a human operator physically located at the site where the system is installed.

Manually Decision Making :

A manual system is a bookkeeping system where records are maintained by hand, without using a computer system. Instead, transactions are written in journals, from which the information is manually rolled up into a set of financial statements.

These systems suffer from a high error rate, and are much slower than computerized systems. Manual systems are most commonly found in small enterprises that have few transactions.

Today, even the smallest retail businesses require implementing some form of inventory management system to keep an accurate stock count, as well as for accounting purposes. The business owners usually have a choice between using an automated and a manual inventory management system.

Here we will discuss the advantages of automated systems over the manual system but first have a look at the manual system also:

The Simplicity

For a small business that stocks a limited amount of inventory or that deals with the inventory slowly, a manual inventory management system can work fine.

The business owner can easily recognize how much stock is on hand with a manual system or simply by applying an eye-ball test in the shop to see if it is time to order more.

The owner won't need to spend a lot of money on inventory management software or spend the time in learning how to operate it.

Sense of Control

A manual system gives a greater sense of control to the small business owner. Rather than depending on a computer to check when it's time to reorder goods, the owner can manage this process on his own due to the small size of business. The requirement to view his stock on a daily basis, such as while counting stock before ordering, gives him the excuse to assess the condition of his stock, minimizing the risk of a customer receiving contaminated goods.

▶ **Analysing Columns to Select the best Metrics for Loan Automation**

	avg_loan_term numeric	avg_number_of_employees numeric	avg_jobs_created numeric	avg_jobs_retained numeric	num_revolving_credit bigint	num_low_doc_loans bigint	total_loans bigint	num_approved_loans bigint	num_disapproved_loans bigint
1	110.7731111442876975	11.4045628452438516	8.4056792126156198	10.7771265015809634	201385	110221	897554	157484	0

avg_loan_term: Average length of the loan in months

avg_number_of_employees: Average number of employees in the business

avg_jobs_created: Average number of jobs created by the loan

avg_jobs_retained: Average number of jobs retained by the loan

num_revolving_credit: Number of loans with a revolving line of credit

num_low_doc_loans: Number of loans through the LowDoc Loan Program

total_loans: Total number of loans in the dataset

num_approved_loans: Number of loans that were approved

num_disapproved_loans: Number of loans that were disapproved or charged off

The top 3 customers with highest bank balance who have not defaulted on a loan in the last 3 years.
This will help us understand your ideal loan applicants.

	name character varying	city character varying	balance_gross integer	mis_status character varying	chgoff_pringr integer	approvalfy1 integer	rank bigint
1	CURTIS JOHNSON GENL BLDG CONTR	BAKERSFIELD CALIFORNIA	0	CHGOFF	0	1969	1
2	RALPH O BURNETT	BAKERSTOWN	0	PIF	0	1969	2
3	KINGS INN	SEATTLE	0	PIF	0	2003	7

The percentage of defaults as per urban and rural status

	urbanrural integer	percentage_paid numeric	percentage_defaulted numeric
1	0	92.7878620140623	7.122577114087489
2	1	75.30213662864816	24.4061379204841
3	2	81.01711649278032	18.71422197328574

we can say that the deafaulters in urban are more compared to rural

The high scaled clients with loan amounts more than 50,00,000

	name character varying	gr_appv integer	mis_status character varying
1	Simon PLC Attorneys & Couns...	5472000	P I F
2	'The Sports Basement, Inc.'	5000000	P I F
3	NetRiver Int. LLC	5000000	P I F
4	International Feed.com Corpora	5000000	P I F
5	Telex Metals, LLC	5000000	P I F
6	McCarty Equipment, Inc	5000000	P I F
7	Premier Energy Services, Inc.	5000000	P I F
8	Yonkers Gateway Motel LLC d...	5000000	P I F
9	Stor-All Pontchartrain, LLC	5000000	P I F
10	Industrial Energy Applications	5000000	P I F
11	Ideal Aerosmith, Inc.	5000000	P I F
12	CARTER BROTHERS, LLC	5000000	P I F
13	Interco Trading Inc	5000000	P I F
14	Greenland (America) Inc.	5000000	P I F
15	Brisam Brooklyn LLC dba: Co...	5000000	P I F
16	Interco Trading, Inc.	5000000	P I F
17	Bentrani Watches, LLC	5000000	P I F
18	Metlcast Industries LLC	5000000	P I F
19	SEATTLE SAFETY, LLC	5000000	P I F
20	Central Woodwork, Inc.	5000000	P I F
21	Quest Aircraft Company, L.L.C.	5000000	P I F
22	CB Franchising LLC	5000000	P I F

Total rows: 41 of 41   Query complete 00:00:00.526

we can say that if Gross amount of loan approved by bank is greater than 50,00,000 then there are 100% chances of loan getting paid in Full

Percentage of loan (paid and defaulted)application by credit score

	lowdoc character varying	percentage_charged_off numeric
1	N	18.686518338009133
2	Y	8.98558350949456

▶ 90% of the customers credit score is not good and the percentage of chgoff is 18% when compared to customers with good credit score is 8.9%

checking your credit standing using different metrics. You can differentiate between key figures and use different key figures according to your bank's needs.

	loan_status text	loan_count bigint
1	Approved	190915
2	Declined	706639

▶ Eg:

Gr_Appv is >50,000 & less than 2.5 lakhs

Term :<= 84 Months

ChgOff_PrinGr:<= 10,000

Disbursement_Gross: <= 2.5lakhs

Conclusions:

1. Princess Manufacturing co,Kings Inn,Curtis Johnson are the ideal loan applicants

2. we can say that if Gross amount of loan approved by bank is greater than 50,00,000 then there are 100% chances of loan getting paid in Full

3. The defaulter's in urban are more compared to rural.

4. 90% of the customers credit score is not good and the percentage of chgoff is 18% when compared to customers with good credit score is 8.9%

5. The Loan with term 40-60 have the most charged off Accounts

6. The gross approval amount was highest in 2011 from (1962-2014)

7. Top Defaulters highlights are
   1. 1. "CHOICE VENDING INC" has taken loan of 24 Lakhs with 22lakhs 23 thousand chgoff amount, loan approved was in 1999
   2. 2. "UNITED YARNS, CO. INC." has taken loan of 24 Lakhs with 21lakhs 57 thousand chgoff amount, loan approved was in 1999
   3. 3. "DOLPHIN LANES OF SOUTH FLORIDA" has taken loan of 22 Lakhs with 17lakhs 98 thousand chgoff amount, loan approved was in 2000

8. These are the top three Industries with highest loan Amounts
   1. Accommodation and food services
   2. Health care and social assistance
   3. Retail trade

Thank You